Project No. 88-537
March 1990

Paul C. Rizzo Associates, Inc.
CONSULTANTS

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Proposal

Remedial Design Investigation

Westinghouse Facility
Beaver, Pennsylvania

Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

WPL 005 5692

132/ 6118878

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PROPOSAL
REMEDIAL DESIGN INVESTIGATION
WESTINGHOUSE ELECTRIC CORPORATION
BEAVER FACILITY

PROJECT NO. 88-537
MARCH 15, 1990

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WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA FACILITY

1.0 INTRODUCTION

In response to your verbal request, Paul C. Rizzo Associates, Inc. (Rizzo Associates) has prepared this proposal to perform a remedial design investigation at the Westinghouse Beaver, Pennsylvania facility as described in the Amended Work Plan.

Rizzo Associates is highly qualified to perform this project. We have extensive experience in performing remedial design investigations and we have extensive experience on projects regulated by the PADER and USEPA. Because of our experience with the Beaver Site, and our review of prior work performed by other consultants and contractors, our knowledge of the site is significant.

Subsequent sections of this proposal describe the history of the site, our proposed scope of work and technical approach, proposed project staff, costs, and schedule.

As requested, we are providing a detailed breakdown of costs on the basis of tasks identified in the Amended Work Plan. Our costs are estimated on a time and materials, and a cost which will not be exceeded without explicit Westinghouse authorization is clearly indicated.

2.0 SITE HISTORY

The Westinghouse Beaver, Pennsylvania facility is located approximately 1500 feet north of the Ohio River at Vanport, Pennsylvania. The surface topography at the site is relatively flat, with an elevation across the site of approximately 780 feet mean sea level (MSL). The normal pool elevation of the Ohio River at Vanport is approximately 682 feet MSL.

The site is bordered to the northwest by the bedrock wall of the Ohio River Valley and to the south by Georgetown Lane, the Beaver Cemetery, and an abandoned sand and gravel quarry. A park and athletic field are to the west and Tuscarawas Road, several businesses, and Beaver High School are to the east of the site.

Two mile Run, a small stream, flows from a topographic valley northeast of the site, along the southern border of the site property, to the southwest where it eventually discharges to the Ohio River. Westinghouse has a permit to discharge treated process water from the wastewater treatment facility at the site to Two mile Run.

The facility was originally operated by Curtiss Wright during World War II to manufacture airplane propellers. Westinghouse began operating at the facility in 1947 to manufacture power distribution equipment. Currently, Westinghouse manufactures circuit breakers at the facility.

Prior to development, the site vicinity included a low-lying marshy area along its southern border near Two mile Run. A line of the Beaver Valley Railroad was located above the marshy area. The line was located near the southern portion of the current main plant building. During the development of the site the 1940's, the elevated portion of the property was excavated and used to fill and grade the lower (southern) portion of the site.

A portion of the Westinghouse property was leased sometime prior to 1967 by Petroleum Solvents, Inc., formerly of Vanport, Pennsylvania. The leased property included a railroad spur located between the plant building and the gravel pit to the south. The leased parcel was used for the transfer of liquid solvents between tank trucks and railroad tank cars.

Operations at the Beaver Facility have included an electroplating process and the treatment and disposal of liquid wastes generated by that process. Electroplating processes have been used at the facility from 1948 through the present.

Electroplating operations in a portion of the plant referred to as the A-9 Area began in 1953. This area was used by Curtiss Wright to access railroad cars docked outside the existing plant building along a railroad spur. In 1953, Westinghouse constructed the A-9 Area for electroplating processes by placing a concrete floor over approximately four feet of fill and enclosing the area to make it part of the plant building.

In 1983, acidic liquid was noted on the ground in the vicinity of the A-9 Area acid waste tank, and in October 1983 four borings were drilled, including installation of two monitoring wells, around the tanks to investigate the extent of the leakage. In one located adjacent to the acid waste tank, low pH groundwater was detected. The PADER was informed that a spill had occurred (Baker 1984a).

On November 17, 1983, another monitoring well was installed to investigate whether the spill affected subsurface material beneath the plant in the vicinity of the A-9 Area plating operations. In this well, a high pH liquid containing cyanide was encountered (Baker, 1984b). In January 1984, the outside tanks were emptied and their use discontinued. Two monitoring wells were installed on February 4, 1984

to determine the extent of high and low pH water. High pH water was encountered in one and groundwater in the other showed no pH anomalies (Baker, 1984c).

After a site visit by PADER personnel on May 31, 1984, a closure plan for the removal of the outside tanks was presented to the PADER on July 25, 1984 and subsequently approved. Beginning in July 1984, the pipelines connecting the plant facilities to the tanks were emptied and either plugged or removed, the use of the equalizer tanks was discontinued, and new PVC lines were installed to transport acid and cyanide rinsewater directly from the sumps to the wastewater treatment plant. The outside tanks were removed by June 28, 1985 in accordance with the closure plan.

Following the removal of the outside tanks, a Phase II Closure Plan investigation was initiated in the A-9 Area as a result of soil beneath the tanks being impacted by liquids from the tanks. The objective of the Phase II investigations was to assess the extent of impact resulting from the leaking tanks and to characterize the geologic and hydrologic conditions in the vicinity of the A-9 Area.

In 1985, concurrent with the tank removal, Rizzo Associates conducted additional investigations, including groundwater sampling of existing wells and a geophysical survey (Rizzo Associates, 1985). In 1986, Rizzo Associates implamented a groundwater investigation, including the installation of four monitoring wells (Rizzo Associates, 1986). One of the wells was screened in the deep groundwater zone and groundwater samples from that well indicated that the cyanide and pH problems had not affected the deep unit.

In June 1986, a remedial action plan for the containment and removal of shallow groundwater in the A-9 Area was submitted to the PADER. The PADER responded to the plan with comments. A revised plan was developed in accordance with PADER comments and submitted to the PADER in March 1987.

Westinghouse initiated remedial activity in June 1986 in the A-9 Area by pumping groundwater from several wells in the area and treating the recovered water at the facility's water treatment plant. This remedial action is still being implemented.

In early 1988, the PADER sampled wells in the A-9 Area and detected chlorinated solvents. In response to this finding, in late 1988, Rizzo Associates advanced ten borings and installed monitoring wells in five of them. The purpose of the investigation was to investigation was to investigate the extent of VOCs in the shallow and deep groundwater beneath the site (Rizzo Associates, 1989).

From December 1988 through February 1989, the PADER performed ten borings in the area between the Westinghouse Plant and the Ohio River installing monitoring wells in all but one. In March and April 1989, Rizzo Associates installed ten shallow and deep monitoring wells around the property of the plant buildings.

In December 1989, Rizzo Associates prepared a Work Plan for additional investigation of the site, including a summary of existing information. That Work Plan described ten tasks developed to address remaining gaps in the information required to design a remediation at the site. In a meeting on January 30, 1989 between Westinghouse and PADER, those tasks were approved by PADER subject to certain modifications which were subsequently incorporated into the Amended Work Plan.

3.0 SCOPE OF WORK AND TECHNICAL APPROACH

The Scope of Work presented herein is based on the scope of work as described by Westinghouse and the Amended Work Plan,. A series of tasks are proposed, as described in subsequent paragraphs.

3.1 TASK 1 - PROJECT PLANNING

Task 1 includes activities required to initiate the investigation. Procurement of subcontractors for drilling, aerial mapping, and laboratory analyses, is included in this task. Included in this task will be updating site-specific health and safety procedures, which will include site specific health and safety information, a hazard assessment, training requirements, monitoring procedures, personnel and equipment decontamination procedures, and other relevant information. Drilling and monitoring well installation and sampling procedures will also be updated under this task.

3.2 TASK 2 - PROJECT MANAGEMENT

Task 2 includes the management time necessary to direct the overall investigation, including cost accounting by task and labor category, scheduling, and meetings with Westinghouse and PADER.

3.3 TASK 3 - FIELD ACTIVITIES

Field activities planned to address the data gaps identified in Section 2.0 include subsurface exploration, soil sampling, monitoring well installation, surveying, groundwater sampling, water level measurement, permeability testing, and well yield evaluation.

3.3.1 Subtask 3.1 - Subsurface Exploration and Well Installation

As described in the Amended Work Plan, 12 borings are anticipated, four in Area A-9, three near the northeast corner of the plant, one in the parking lot across North Walnut Lake, and five along Georgetown Lane near the plant entrance. An as-yet unspecified number of monitoring

wells will be installed in these borings. This task encompasses all field work associated with drilling and monitoring well installation and subsurface soil sampling for geotechnical and chemical analyses.

The drilling subcontractors will be Terra Testing of Pittsburgh, Pennsylvania and Duncan Brothers of New Galilee, Pennsylvania. Costs for drilling and monitoring well installation have been estimated based on quoted unit prices and the assumption that drilling will be performed using Health and Safety Level D.

3.3.2 Subtask 3.2 - Ground Surveying

Existing shallow monitoring wells in Area A-9, PADER wells, Vanport's Monitoring Wells VT-1 and VT-2, and the new monitoring wells will be surveyed for horizontal and vertical control as required. Horizontal locations will be determined relative to the State Plane Coordinate System. Vertical elevations of the top of casing and top of PVC riser pipe will be determined to the nearest 0.01 feet. Vertical elevations of the ground surface will be determined to the nearest 0.1 feet.

3.3.3 Subtask 3.3 - Groundwater Sampling

Two types of groundwater sampling will be performed: dense-phase liquid sampling and representative groundwater sampling. Five wells will be sampled for dense-phase liquids, if present. These samples will be analyzed for VOCs.

In order to provide a complete "snapshot" of the distribution of VOCs in shallow and deep groundwater at one point in time, a round of groundwater sampling will be performed for all existing and newly installed monitoring wells. Groundwater samples will be analyzed for VOCs and cyanide.

Quality control samples will include duplicate groundwater samples from two wells, a duplicate dense-phase sample, one field blank, one VOC trip blank per day of sampling, and triple sample volume from one well so

that the laboratory can perform matrix spike and matrix spike duplicate analyses. Chain-of-custody will be maintained throughout the sampling activities.

3.3.4 Subtask 3.4 - Water Level Measurement and Permeability Testing

A complete round of water levels will be taken upon completion of Subtasks 3.1, 3.2, and 3.3. Water levels will be measured to the nearest 0.01 feet from the top of casing. The Amended Work Plan specifies that additional rounds of groundwater levels will be taken quarterly for the next two years in order to evaluate possible seasonal variations in the geohydrologic regime. Only the first such round is included in this proposal.

Selected monitoring wells will be tested for their hydraulic properties and yield using single-well permeability tests. These tests will be performed by removing water and measuring water-level recovery with a pressure transducer and data logger. The hydraulic testing data will be transferred from the data logger to magnetic media for long-term storage. The data will be used to estimate potential well yield and the hydraulic conductivity of the soils in which the monitoring wells are screened. As a minimum, these tests will be performed in Wells MW-1, MW-7, and MW-16.

3.4 TASK 4 - LABORATORY ANALYSIS AND DATA VALIDATION

As described above, selected subsurface soil samples will be analyzed for Atterberg limits and grain size distribution. Subsurface soil samples will be analyzed for pH, metals, VOCs, and total and free cyanide. Dense-phase liquid samples will be analyzed for VOCs. Groundwater samples will be analyzed for VOCs and cyanide.

In order to assure that the data generated can relied upon, laboratory data will be validated, including consideration of factors such as sample holding times, instrument calibration, results in blanks, and matrix spike interferences. Laboratory services will be supplied by NUS Laboratories of Pittsburgh, Pennsylvania.

3.5 TASK 5 - ENGINEERING ANALYSIS

Task 5 includes analysis required to assess the hydrological regime. This will include preparation of geological cross-sections, updated contours of bedrock surface and water levels, analysis of permeability test and grain size distribution data, and assessment of VOC and cyanide distribution.

3.6 TASK 6 - CONCEPTUAL DESIGN FOR SHALLOW GROUNDWATER REMEDIATION

Task 6 comprises the engineering analyses required to design the remedial system for the shallow groundwater zone. These analyses will include evaluation of vacuum extraction and various groundwater recovery schemes with regard to feasibility of implementation. The assessment of groundwater treatment issues will be by the Corporate Environmental Affairs Group of Westinghouse. A conceptual design of the preferred remedy will be developed, including cost calculation and performance criteria.

3.7 TASK 7 - TECHNOLOGY SCREENING FOR DEEP GROUNDWATER

Task 7 includes identification and evaluation of various technologies which may be applicable to mitigating the potential effects of VOCs in deep groundwater at the Westinghouse property upon groundwater in other areas. The screening will concentrate on technologies which isolate deep groundwater in the buried valley under the plant from the rest of the alluvial pool in order to mitigate the potential migration pathway. Criteria to be considered include effectiveness, reliability, cost, and/or permitting requirements.

3.8 TASK 8 - REPORT PREPARATION

A report will be prepared which will document the methods used to gather data, the results of the testing and analyses, and findings based on the data and analyses. The data of previous investigations will be combined with the results of the this investigation and a comprehensive description of the overall hydrogeologic setting of the Westinghouse plant site will be presented.

The report preparation task will proceed as follows:

- A preliminary outline will be prepared for review by Westinghouse.
- A rough draft of the text will be prepared to solicit comments from Westinghouse.
- A meeting will be held to discuss comments of the rough draft version of the report.
- A revised draft will be prepared and comments will be solicited and discussed.
- The report will be finalized and submitted for regulatory approval.

The report will include a conceptual design of the selected remedial alternative for the shallow groundwater and the assessment of remedial alternatives for the deep groundwater.

4.0 PROPOSED PROJECT STAFF

Rizzo Associates proposes a project team which is highly experienced in soil and groundwater investigations and whose key individuals are extremely familiar with the Beaver Site and previous investigations conducted there. Brief descriptions of the proposed staff are provided in the following paragraphs. A proposed organization chart is provided on Figure 1. Full resumes for all identified staff are provided in Appendix A.

- Principal-in-Charge/Project Manager: Patrick F. O'Hara
  Mr. O'Hara is Vice President of Environmental Services for Rizzo Associates. He was principal-in-charge for previous investigations at the site, and is well-known to Westinghouse and PADER staff who have worked on the Beaver Site.

- Sr. Project Engineer: David M. Brown
  Mr. Brown is a Senior Project Engineer for Rizzo Associates. He prepared the Amended Work Plan for this project and is acquainted with Westinghouse and PADER staff associated with this site. Mr. Brown's technical specialties are groundwater hydrology and contaminant fate and transport.

- Sr. Project Geologist: William A. Baughman
  Mr. Baughman is experienced in hazardous waste investigations and has previously worked at the Beaver Site. He will be committed to the project for the duration of the work proposed herein and coordinate his involvement with the East Pittsburgh investigation with this assignment.

- Project Consultant: Kenneth J. Bird
  Mr. Bird, who has expertise in analytical chemistry, industrial hygiene, and site remediation, will serve as a consultant to the project. Specifically, he will provide guidance to Ms. Jenkins and Ms. Vargas who are discussed below.

- Project Consultant: Mark P. Zatezalo
  Mr. Zatezalo acts as in-house consultant for hydrogeology for all Rizzo Associates projects, and he is familiar with the Beaver Site. He has served in a similar role for previous Rizzo Associates work at Beaver.

- Project Consultant: Marcella J. Blasko
  Ms. Blasko will provide review on engineering design aspects of the project. She has been involved in numerous remedial design projects with Rizzo Associates.

- Quality Assurance: Beth F. Cockcroft
  Ms. Cockcroft is Director of Quality Assurance for Rizzo Associates, and she will be responsible for quality assurance activities for the project. She is familiar with the quality aspects of hazardous waste site investigations.

- Data Validation: Christine L. Vargas
  Ms. Vargas reports to Mr. Bird and she will be responsible for validation of all data obtained from the analytical laboratory. She is fully committed to this role for the duration of the project.

- Health and Safety: Beth Ann Jenkins
  Ms. Jenkins also reports to Mr. Bird and she will be responsible for monitoring health and safety aspects of work at the site.

- Project Staff: Jeffrey D. Holchin, Matthew E. Grebner, and Scott A. Harris
  These individuals are candidates for the project staff and in this capacity will be involved in field sampling, data gathering, and analysis and reporting of data.

The Rizzo Associates staff currently numbers about 80 people. The proposed workload is consistent with existing commitments on other Westinghouse projects. Staff level personnel assigned to the project will remain involved with the project to its completion to the extent they are needed.

5.0 COSTS

Estimated costs for the tasks described in Section 3.0 are presented in Tables 1 through 4. Table 1 provides the estimated hours by category for each task. The associated labor costs are presented in Table 2. Expenses for the various tasks are indicated in Table 3, and the total cost, including markup on expenses is presented in Table 4. Costs for associated contractors are not included in the totals as they will be paid directly by Westinghouse. The estimated costs for Terra Testing, Duncan Brothers, and MUS Laboratories are shown in Tables 5 through 7. Rizzo Associates personnel in the various billing categories are identified in Table 8.

Costs will be tracked in the same manner as for the Westinghouse Gettysburg projects. A spreadsheet detailing expenditures for each task will be submitted with the monthly invoice. The spreadsheet will indicate the budget for each task as well as the percentage completion of the various tasks.

The estimated cost for the work to be performed by Rizzo Associates described herein is $129,180.

6.0 SCHEDULE

The work proposed herein shall be performed in accordance with the schedule submitted in the Amended Work Plan (Figure 12 of that report) as approved by PADER. This means that field activities should initiate in March, 1990 culminating in issuance of the design report by June 30, 1990. Rizzo Associates can maintain this schedule if authorization to proceed is received by March 15, 1990.

7.0 SUMMARY

Rizzo Associates has prepared this proposal in a manner which we believe is responsive to your request. The proposal addresses the scope of work defined in the Amended Work Plan.

The project team proposed for the work is experienced in performing remedial design investigations and is familiar with the site, its history, previous engineering studies, and the personnel involved for both Westinghouse and PADER. We are confident that we will undertake this project in a manner that will enable a successful and relatively cost-effective remediation program.

In closing, we sincerely appreciate the opportunity to propose on this remedial design investigation for the Beaver Facility, and look forward to continuing our relationship with Westinghouse.

Respectfully submitted,

David M. Brown
Senior Project Engineer

Patrick F. O'Hara
Vice President

PFO/DMB/dlm

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TABLES

TABLE 1
LEVEL OF EFFORT - MANHOURS
R1220 ASSOCIATES
WESTINGHOUSE ELECTRIC CORPORATION
REMEDIAL DESIGN INVESTIGATION
BEAVER FACILITY

TASK NUMBER	DESCRIPTION	OFFICER	PRIN	PROJECT MANAGER	SR PROJ ENGR	SR PROJ GEOL	ASST PR ENGR	ENGR	FIELD SUPER	HEAD DRAFT	DRAFT	TECH	SECT/ WORD PR	CLERK	TOTAL
1	Project Planning	8	8	0	8	8	20	0	0	0	4	0	4	0	60
2	Project Management	100	0	0	60	0	0	0	0	0	0	0	8	8	176
3.1	Drilling	2	2	2	10	200	8	0	0	0	0	0	0	0	224
3.2	Ground Surveying	2	2	2	0	0	0	0	20	0	20	40	0	0	86
3.3	Groundwater Sampling	2	2	2	60	60	8	110	0	0	0	0	0	0	244
3.4	Permeability Testing	2	2	2	30	0	0	30	0	0	0	0	0	0	66
4	Laboratory Analysis	0	8	0	20	0	80	0	0	0	0	0	0	0	108
5	Engineering Analysis	0	8	8	80	40	0	60	0	4	40	0	0	0	240
6	Conceptual Design - Shallow	20	16	0	80	0	0	120	0	0	0	0	0	0	236
7	Technology Screening - Deep	10	16	0	30	0	0	40	0	0	0	0	0	0	96
8	Report Preparation	40	8	8	80	40	10	100	0	20	200	20	40	0	566
	TOTAL HOURS	186	72	24	458	348	126	460	20	24	264	60	52	8	2102
	CHECK														2102

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TABLE 2
LEVEL OF EFFORT - COST
RIZZO ASSOCIATES
WESTINGHOUSE ELECTRIC CORPORATION
REMEDIAL DESIGN INVESTIGATION
BEAVER FACILITY

TASK NUMBER	DESCRIPTION	OFFICER	PRIN	PROJECT MANAGER	SR PROJ ENGR	SR PROJ GEOL	ASST PR ENGR	ENGR	FIELD SUPER	HEAD DRAFT	DRAFT	TECH	SECY/ WORD PR	CLERK	TOTAL
		$100.00	$90.00	$79.00	$63.00	$63.00	$47.00	$39.00	$39.00	$47.00	$37.00	$32.00	$29.00	$21.00	
1	Project Planning	$800	$720	$0	$504	$504	$940	$0	$0	$0	$148	$0	$116	$0	$3,732
2	Project Management	$10,000	$0	$0	$3,780	$0	$0	$0	$0	$0	$0	$0	$232	$168	$14,180
3.1	Drilling	$200	$180	$158	$630	$12,600	$376	$0	$0	$0	$0	$0	$0	$0	$14,144
3.2	Ground Surveying	$200	$180	$158	$0	$0	$0	$0	$780	$0	$740	$1,280	$0	$0	$3,338
3.3	Groundwater Sampling	$200	$180	$158	$3,780	$3,780	$376	$4,290	$0	$0	$0	$0	$0	$0	$12,764
3.4	Permeability Testing	$200	$180	$158	$1,890	$0	$0	$1,170	$0	$0	$0	$0	$0	$0	$3,598
4	Laboratory Analysis	$0	$720	$0	$1,260	$0	$3,760	$0	$0	$0	$0	$0	$0	$0	$5,760
5	Engineering Analysis	$0	$720	$632	$5,040	$2,520	$0	$2,340	$0	$188	$1,480	$0	$0	$0	$12,920
6	Conceptual Design - Shallow	$2,000	$1,440	$0	$5,040	$0	$0	$4,680	$0	$0	$0	$0	$0	$0	$13,160
7	Technology Screening - Deep	$1,000	$1,440	$0	$1,890	$0	$0	$1,560	$0	$0	$0	$0	$0	$0	$5,890
8	Report Preparation	$4,000	$720	$632	$5,040	$2,520	$470	$3,900	$0	$940	$7,400	$640	$1,160	$0	$27,422
	TOTAL DIRECT LABOR CHECK	$18,600	$6,480	$1,896	$28,854	$21,924	$5,922	$17,940	$780	$1,128	$9,768	$1,920	$1,508	$168	$116,888 $116,888

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TABLE 3
REIMBURSABLE EXPENSES
REZZO ASSOCIATES
WESTINGHOUSE ELECTRIC CORPORATION
REMEDIAL DESIGN INVESTIGATION
BEAVER FACILITY

TASK NUMBER	DESCRIPTION	VEHICLE	EQUIP RENT	COMPUTER/ WORD PROC	COMM-POSTAGE	REPRO	MISC	TOTAL
		$80.00	N/A	$9.00	N/A	N/A	N/A	
1	Project Planning	$0	$0	$79	$20	$20	$100	$219
2	Project Management	$0	$0	$79	$20	$20	$100	$219
3.1	Drilling	$1,760	$1,150	$158	$5	$20	$250	$3,343
3.2	Ground Surveying	$176	$0	$158	$5	$5	$250	$594
3.3	Groundwater Sampling	$880	$1,150	$158	$5	$20	$250	$2,463
3.4	Permeability Testing	$264	$0	$158	$5	$5	$250	$682
4	Laboratory Analysis	$0	$0	$0	$20	$20	$100	$140
5	Engineering Analysis	$0	$0	$436	$20	$20	$100	$576
6	Conceptual Design - Shallow	$0	$0	$0	$20	$20	$100	$140
7	Technology Screening - Deep	$0	$0	$0	$20	$20	$100	$140
8	Report Preparation	$0	$0	$2,374	$100	$1,000	$100	$3,774
	TOTAL REIMBURSABLE EXPENSES	$3,080	$2,300	$3,802	$240	$1,170	$1,700	$12,292
	CHECK							$12,292

NOTE: COSTS INCLUDE MARKUP OF 10% ON EXPENSES.

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TABLE 4
SUMMARY OF COSTS
RIZZO ASSOCIATES
WESTINGHOUSE ELECTRIC CORPORATION
REMEDIAL DESIGN INVESTIGATION
BEAVER FACILITY

TASK NUMBER	DESCRIPTION	TIME	EXPENSES	TOTAL
1	Project Planning	$3,732	$219	$3,951
2	Project Management	$14,180	$219	$14,399
3.1	Drilling	$14,144	$3,343	$17,487
3.2	Ground Surveying	$3,338	$594	$3,932
3.3	Groundwater Sampling	$12,764	$2,463	$15,227
3.4	Permeability Testing	$3,598	$682	$4,280
4	Laboratory Analysis	$5,740	$140	$5,880
5	Engineering Analysis	$12,920	$576	$13,496
6	Conceptual Design - Shallow	$13,160	$140	$13,300
7	Technology Screening - Deep	$5,890	$140	$6,030
8	Report Preparation	$27,422	$3,774	$31,196
	TOTALS	$116,888	$12,292	$129,180
	CHECK			$129,180

NOTE: COSTS INCLUDE MARKUP OF 10% ON EXPENSES.

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TABLE 5

TERRA TESTING ESTIMATED COSTS

ITEM	AMOUNT	UNIT PRICE	PRICE
Mobilization & Demobilization	1 ea	$400.00/ea	$ 400.00
Augering (3.75-inch augers with continuous sampling)	80 ft	15.00/ft	1,200.00
Augering (3.75-inch augers with sampling at 2.5-foot intervals)	125 ft	14.00/ft	1,750.00
Augering (3.75-inch augers with sampling at 5.0-foot intervals)	475 ft	13.00/ft	6,175.00
Augering (6.25-inch augers with no sampling)	150 ft	11.00/ft	1,650.00
Cement	120 bags	8.00/bag	960.00
Bentonite (powdered)	4 bags	20.00/bag	80.00
Grouting	30 hr	100.00/hr	3,000.00
PVC Screen (2-inch)	50 ft	5.50/ft	275.00
PVC Riser (2-inch)	150 ft	4.25/ft	637.50
Sand	30 bags	8.00/bag	240.00
Bentonite (pellets)	300 lb	1.50/lb	450.00
Caps (PVC, locking)	6 ea	25.00/ea	150.00
Protective Casing	6 ea	120.00/ea	720.00
Well Installation	20 hr	100.00/hr	2,000.00
Well Development	30 hr	100.00/hr	3,000.00
Decontamination	10 hr	100.00/hr	1,000.00
Steam Cleaner (rental)	20 days	35.00/day	700.00
Water Hauling	20 hr	35.00/hr	700.00
Standby	0 hr	100.00/hr	.00
	TOTAL		$25,087.50

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TABLE 6

DUNCAN BROTHERS ESTIMATED COSTS

ITEM	AMOUNT	UNIT PRICE	PRICE
Mobilization & Demobilization	1 ea	$300.00/ea	$ 300.00
Drilling (10-inch diameter, mud or air rotary)	8 hr	120.00/hr	960.00
Casing Rental (10-inch)	100 ft	8.00/ft	800.00
Welder	2 hr	35.00/hr	70.00
Cement	50 bags	8.75/bag	437.50
Bentonite (powdered)	1 bags	13.50/bag	13.50
Stainless Steel Screen (4-inch)	10 ft	59.80/ft	598.00
Stainless Steel Riser (4-inch)	20 ft	32.50/ft	650.00
Adapter (4-inch, steel to PVC)	1 ea	65.00/ea	65.00
PVC Riser (4-inch)	70 ft	3.25/ft	227.50
Sand	8 bags	5.50/bag	44.00
Bentonite (pellets)	1 bucket	65.00/bucket	65.00
Well Installation	4 hr	90.00/hr	360.00
Decontamination	3 hr	90.00/hr	270.00
Steam Cleaner (rental)	2 days	125.00/day	250.00
Standby	0 hr	90.00/hr	.00
	TOTAL		5,425.50

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TABLE 7

NUS LABORATORIES ESTIMATED COSTS

ANALYSIS	AMOUNT	UNIT PRICE	PRICE
Soil pH	18 ea	$11.00/ea	$ 198.00
Soil VOCs (Target Analyte List with validation data)	18 ea	405.00/ea	7,290.00
Soil Metals (Target Analyte List with validation data)	18 ea	570.00/ea	10,260.00
Soil Cyanide (total and free)	18 ea	92.00/ea	1,656.00
Soil Grain Size (Sieve and hydrometer)	3 ea	104.00/ea	312.00
Soil Grain Size (Sieve only)	3 ea	52.00/ea	156.00
Soil Atterberg Limits	6 ea	52.00/ea	312.00
Aqueous VOCs (Target Analyte List with validation data)	45 ea	360.00/ea	16,200.00
Aqueous Cyanide (total and free)	32 ea	62.00/ea	1,984.00
	TOTAL		$38,368.00

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TABLE 8

PERSONNEL CLASSIFICATIONS

Officer	- Patrick F. O'Hara
Principal	- Kenneth J. Bird - Marcella J. Blasko - William J. Johnson - Mark P. Zatezalo
Project Manager	- Beth F. Cockcroft
Sr. Project Engineer	- David M. Brown
Sr. Project Geologist	- William A. Baughman
Asst. Project Engineer/ Scientist	- Beth Ann Jenkins - Christine L. Vargas
Engineer	- Matthew E. Grebner - Scott A Harris - Jeffrey D. Holchin

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APPENDIX A

RESUMES

PRIVILEGED

PATRICK F. O'HARA
VICE PRESIDENT

Mr. O'Hara serves as a Principal-in-Charge, Project Manager, or Internal Consultant for environmental science and engineering projects. His primary areas of expertise include site investigation and engineering analysis and design. He has participated in numerous studies of nuclear facilities, chemical waste sites, and design and construction of new chemical and nuclear waste disposal facilities. Mr. O'Hara has authored ten technical publications in the fields of environmental engineering and quality assurance.

EDUCATION
Graduate Studies, Civil Engineering, University of Pittsburgh
B.S., 1974, Civil Engineering, University of Pittsburgh

REGISTRATION/CERTIFICATION
Professional Engineer, Pennsylvania
Health and Safety Training in accordance with OSHA Regulations
29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Certified Nuclear Quality Assurance Auditor (ANSI N.45.2.23)

EXPERIENCE AND BACKGROUND
1984 to Present - Vice President - Environmental Services, Rizzo Associates. In early 1984, Mr. O'Hara and several of his colleagues formed Rizzo Associates, Inc. He currently serves as Vice President responsible for environmental science and engineering projects. He has served as Project Manager for remedial construction projects; RI/FS projects and RFI/CMS projects; remedial design programs for NPL sites; investigations for divestitures of real estate; and investigations, design, and permitting for new waste disposal facilities, including a landfill with a capacity of approximately 100 million cubic yards. He has worked on remedial and removal programs for 21 sites on the National Priorities List. His work has included design of foundation improvements for structures to be founded upon sanitary landfills, groundwater investigation and monitoring programs, and the development of health and safety and quality assurance plans for hazardous waste projects. Mr. O'Hara has participated in public meetings and regulatory negotiations and has successfully managed projects with up to $250,000 per month in billings. He has served as a consultant in developing and assessing quality assurance programs for site investigations for a European consulting firm actively involved in nuclear facility construction and for the Atomic Energy Commission of Israel. Mr. O'Hara currently serves on the Environmental Affairs Committee of the Consulting Engineers Council of Pennsylvania.

1975 to 1984 - Assistant Project Engineer to Quality Assurance Director, D'Appolonia Consulting Engineers. In 1975, Mr. O'Hara joined the D'Appolonia group of companies. He participated in the development of the Corporate Quality Assurance Program and the application of the program to projects throughout the corporation. He was responsible for quality assurance reviews and audits for approximately 70 investigation,

design, and construction projects. His work included conducting training sessions in quality control for personnel throughout the company; preparation, documentation, and verification of computer programs; field and laboratory testing; development of testing procedures; and report preparation. He also participated in the development and review of client quality assurance programs on a consulting basis. In 1983, Mr. O'Hara was delegated responsibility for managing the Corporate Quality Assurance Program and managing its implementation in five American and three European offices. Several projects in which Mr. O'Hara had significant technical participation are: 1) hydrologic, geotechnical, and seismological site evaluation for the Defense Nuclear Waste Processing Facility at the Savannah River Plant in Aiken, South Carolina; 2) project quality assurance for geotechnical and hydrogeologic testing programs at the nuclear waste demonstration repository (WIPP Project) in Carlsbad, New Mexico; 3) hydrogeologic and contaminant migration studies for the Split Rock Uranium Mill for the Western Nuclear Corporation in Jeffrey City, Wyoming; 4) turnkey remediation of the Hooker Chemical Plant in Montague, Michigan (pre-Superfund); 5) RI/FS consulting services for two NPL sites in northern Illinois; 6) remediation of the Enterprise Avenue Superfund Site in Philadelphia; 7) remediation of the Hranica Landfill Superfund Site in western Pennsylvania; and 8) remediation of the Aidex Chemical Superfund Site in Iowa. He also conducted independent quality assurance audits of site investigations, design, and licensing studies for over 30 existing or proposed nuclear facilities located on four continents.

1974 to 1975 - Civil/Structural Engineer, Bechtel Power Corporation. Mr. O'Hara served as a civil/structural engineer responsible for structural analysis and preparation of design documents for a standardized nuclear power plant. He also was responsible for software development, preparation, and verification in accordance with nuclear industry standards.

1973 to 1974 - Prior to earning his degree, Mr. O'Hara was employed as a geotechnical laboratory technician with the Pittsburgh District Laboratory of the U.S. Army Corps of Engineers.

CONTINUING EDUCATION
USEPA Intermediate Level Training in accordance with Order 14402, Chorpus Christi State University
Numerous short courses and seminars in civil and environmental engineering

AFFILIATIONS
American Society of Civil Engineers
International Society of Soil Mechanics and Foundation Engineering
Hazardous Materials Control and Research Institute
Consulting Engineers Council of Pennsylvania, Environmental Affairs Committee

PUBLICATIONS
Mr. O'Hara has authored 12 technical publications in the fields of environmental engineering and quality assurance.

PRIVILEGED

KENNETH J. BIRD
PRINCIPAL
DIRECTOR OF REMEDIATION PLANNING

Mr. Bird has extensive experience related to hazardous waste sites including preparation of RI/FS Work Plans for quality assurance and health and safety, supervision of the site field investigations and remedial action programs, and management of projects involving remedial design implementation. He is currently responsible for the preparation and implementation of remedial investigations, risk assessments, project health and safety plans, chemical analysis programs, and hazard assessments for environmental projects. He is also in charge of training all of the firm's professional staff to meet the requirements of OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." He has personally served as the on-site health and safety officer at several EPA remedial action projects, including the Lipari Landfill waste containment project (Ranked No. 1 on the National Priorities List).

EDUCATION
M.S., 1982, Industrial Hygiene, University of Pittsburgh
B.S., 1977, Biology (Chemistry Minor), Indiana University of Pennsylvania

REGISTRATION/CERTIFICATIONS
American Board of Industrial Hygiene, Certified Industrial Hygienist
Certified Commercial Scuba Diver
Health and Safety Training (Instructor) in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"

EXPERIENCE AND BACKGROUND
1985 to Present - Project Manager to Principal - Director of Remediation Planning, Rizzo Associates. Mr. Bird is responsible for remedial planning projects including remedial investigations, feasibility studies, and waste removal remedial actions. He has extensive experience interacting with regulatory agencies, community relations, and in monitoring the performance of remedial action contractors.

Mr. Bird has designed, implemented, and managed remedial activities that deal with a variety of projects. These projects include slurry wall construction, drum material excavation, sampling, treatment and disposal, lagoon sampling, and sludge solidification.

1984 to 1985 - Health and Safety Supervisor, NUS Corporation. Mr. Bird developed health and safety plans for numerous remedial investigations. He participated in various site activities relative to investigations, including initial reconnaissance, land and geophysical surveying, environmental sampling, test pit activities, and drilling. He was also the manager and instructor of the REM I (Zone 1) Hazardous Waste Training Program.

1977 to 1984 - Organics Laboratory Group Leader to Health and Safety Supervisor, D'Appolonia Consulting Engineers, Inc. Mr. Bird provided overall supervision of on-site mobile laboratories supporting hazardous waste site cleanup activities. Mr. Bird was responsible for training, developing analytical procedures, and reviewing and reporting data. Two of the more unique laboratory projects were Enterprise Avenue, Philadelphia and Crystal Chemical, Houston.

In addition to his responsibilities as supervisor of on-site mobile laboratories, Mr. Bird formerly served as the Organics Section Group Leader in the D'Appolonia Corporate Environmental Laboratory. Mr. Bird also had extensive experience with most wet chemical analytical techniques presently being employed, including potentiometric, gravimetric, titrimetric and spectrophotometric techniques.

CONTINUING EDUCATION
Asbestos Abatement Council, Asbestos Abatement Certified Contractor No. 5-85-282-93
EPA Intermediate Level Training Program, National Spill Control School, Corpus Christi State University
EPA Superfund Health and Safety Training Course, NUS Corporation, Pittsburgh, Pennsylvania
Gas Chromatography, Perkin-Elmer Corporation, Norwalk, Connecticut
Gas Chromatographic Applications for Water Quality Laboratories, U.S Environmental Protection Agency, Cincinnati, Ohio
Mass Spectrometry Workshop, Spectroscopy Society of Pittsburgh

AFFILIATIONS
American Industrial Hygiene Association

PUBLICATIONS
Mr. Bird has authored six technical publications regarding health and safety and hazardous waste remediation issues.

PRIVILEGED

MARCELLA J. BLASKO
PRINCIPAL
DIRECTOR OF REMEDIATION DESIGN

Ms. Blasko has broad experience in environmental and geotechnical engineering and surface and groundwater investigations. Her experience includes projects related to solid and hazardous waste management, site development, dams, airports, wastewater treatment plants, water treatment plants, and industrial buildings. She has been involved in all aspects from field investigation to analysis, design, permitting, specification preparation, cost estimating, and construction inspection.

EDUCATION
Graduate Studies, 30 credits, Civil Engineering, University of Pittsburgh
B.S., 1977, Civil Engineering, University of Pittsburgh

REGISTRATION/CERTIFICATION
Professional Engineer, Pennsylvania
Health and Safety Training in Accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"

EXPERIENCE AND BACKGROUND
1985 to Present - Project Manager to Director of Remediation Design, Rizzo Associates. Since joining Rizzo Associates, Ms. Blasko has served as project manager for dam remediation studies involving on-site investigations, dam stability analyses and development, and evaluation of remedial alternatives. Detailed plans, construction specifications, and cost estimates for the selected remediations were prepared. Ms. Blasko also served as manager for the total design and bid package preparation for the remediation programs at three waste sites. Design plans, specifications, and cost estimates were prepared for the excavation, handling, storage, analysis, and disposal of buried waste, overall site grading and development, clay and synthetic cap systems, leachate collection and treatment, access road design, and groundwater and air monitoring plans. She was also responsible for the engineering design of an interim storage facility for PCB-contaminated materials including site development plans, construction drawings, specifications, and technical review.

1983 to 1985 - Vice President, Earth Inc. Ms. Blasko's engineering duties included serving as project engineer for soils and geologic investigations for roads and airports including investigations to determine causes of major airport pavement distress; foundation investigations for buildings, bridges, wastewater treatment and water treatment plants; groundwater studies at hazardous waste sites;

geotechnical/hydrologic/hydraulic investigations of existing dams, including development of remedial measures; and pre- and post-development hydrologic analyses. Additional duties included supervising laboratory testing (both soil and rock), and consulting during the construction of buildings, bridges, etc.

1982 to 1983 - Geotechnical Engineer, Green International, Inc. Some of the projects Ms. Blasko worked on while at Green included geotechnical engineering investigations for various airports including pavement design, pre- and post-development hydrologic/hydraulic investigations including sizing of stormwater detention ponds, settlement and stability analyses for bridge embankments, a preliminary environmental reading for the conversion of a warehouse into an office complex with presentation of geotechnical and hydraulic mitigating measures, a geotechnical/hydrological/hydraulic investigation, and design of a landfill access road.

1980 to 1982 - Civil Engineer, Mine Safety and Health Administration, U.S. Department of Labor. Her duties included technical review of earth and mine refuse dam designs and field and laboratory soils testing. She instructed field personnel in slope stability instrumentation and the use of slope stability computer programs STABL and BISHOP. Computer courses taken while with MSHA included: HEC2, HEC1, DAMBREAK, TR-20, and WSP2.

1978 to 1980 - Engineer, West Virginia Department of Highways. Ms. Blasko served as a project engineer on three construction projects: a culvert bridge; a slide correction project; and a single-span steel bridge. Duties included supervision and coordination of inspectors, preparation of partial payment estimates, initiation of change orders, and preparation of as-built drawings. She also served as assistant project engineer on a major highway construction project. Ms. Blasko's duties included supervision and coordination of inspectors; quantity calculations; preparation of as-built drawings; public relations; inspection of concrete placement, reinforcing steel placement, seeding, building demolition, excavation and backfilling, compaction and roadway lighting.

AFFILIATION
American Society of Civil Engineers - Program Chairperson of the Pittsburgh ASCE Geotechnical Group.

PUBLICATIONS
Ms. Blasko is the author of three technical publications.

(Marcella J. Blasko)

PUBLICATIONS/PRESENTATIONS

Blasko, Marcella J., et.al, 1987, "Design of Remedial Measures and Waste Removal Program, Lackawanna Refuse Superfund Site," Superfund '87, Proceedings of the 8th National Conference, Hazardous Materials Control Research Institute, Silver Springs, Maryland, pp. 367-370.

Withiam, J.L., P.F. O'Hara, and M.J. Blasko, 1986, "Seismic Stability of Dredged Slopes in the Charleston Area," Proceedings of the Third U.S. National Conference on Earthquake Engineering, Volume 1, Earthquake Engineering Research Institute, El Cerrito, California, pp. 477-488.

Blasko, Marcella J., 1988, "Rehabilitation of a 19th Century Dam," 1988 Southern States Dam Safety Conference and Public Awareness Workshop, Jackson, Mississippi, presentation only, no published proceedings.

PRIVILEGED

WILLIAM J. JOHNSON
PRINCIPAL - GEOSCIENCES

Mr. Johnson possess a diverse background in geology, hydrogeology, and geophysics as applied to environmental and geotechnical studies. During his career, he has been responsible for comprehensive site characterization studies for solid waste landfills, Superfund sites, off-shore production platforms, nuclear power plants, dams, and major industrial facilities in the U.S. and overseas. He has supervised well installation, exploratory drilling and sampling, and geophysical field activities within the firm. Mr. Johnson has authored nearly 30 publications and presentations concerning geophysical, seismic, and environmental topics.

EDUCATION
M.S., 1973, Geology, Michigan Technological University
B.S., 1969, Applied Geophysics, Michigan Technological University

CERTIFICATION
Health and Safety Training in Accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."

EXPERIENCE AND BACKGROUND
1984 to Present - Principal - Geosciences, Rizzo Associates. In his current position, Mr. Johnson is responsible for the technical quality of geosciences work on all projects within the firm, including those associated with environmental engineering, geologic mapping, geotechnical studies, applied geophysics, and seismic hazard analyses. His recent work has included:

- Completion of a siting study on the north coast of Puerto Rico for a solid waste landfill. In this area, siting is complicated by extensive karst topography, active floodplains, and wetlands.
- Completion of an Environmental Impact Study (EIS) for a solid waste landfill in Puerto Rico. Mr. Johnson was completely responsible for all aspects of the site characterization.
- Several site characterization studies using geophysics in addition to drilling, sampling, and well installation at locations where hazardous waste was suspected or known to have been spilled or disposed.

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(William J. Johnson)

- As the Principal Investigator for a geophysical research project for the U.S. Air Force, Mr. Johnson recently authored a publication entitled, "Application of Geophysical Technology to Assessment of Deep Geotechnical Conditions." This study is one of the most comprehensive comparisons of geophysics and geotechnics ever published.

Within Rizzo Associates, Mr. Johnson is responsible for training and the quality control for field investigations involving drilling and sampling, well installation, and geophysics.

1983 to 1984 - Manager, Geophysical Group, IT Corporation. In this capacity, he was responsible for numerous geophysical investigations at hazardous waste sites. Mr. Johnson planned and supervised field surveys using gravity, magnetics, resistivity, seismic refraction and reflection, and cross-hole measurements to determine dynamic and engineering properties of soil and rocks.

1973 to 1983 - Project Geologist to Project Supervisor, D'Appolonia Consulting Engineers. Mr. Johnson was responsible for the technical supervision of numerous projects, including a Hot Dry Rock (HDR) project which involved the integration of diverse geophysical techniques, drilling, thermal measurements, and hydrogeologic studies to target a deep geothermal resource in basement rock under the Atlantic Coastal Plain.

As part of site characterization studies for nuclear power plants, major industrial facilities, dams, and offshore platforms, Mr. Johnson conducted numerous seismic hazard assessments, geotechnical investigations, and geophysical studies more than ten countries. His work included responsibility for the design, installation, field operations, and interpretation of microearthquake monitoring networks in Spain and Honduras.

AFFILIATIONS
Director - Pennsylvania Council of Professional Geologists Society of Exploration Geophysicists

PUBLICATIONS
Mr. Johnson has authored approximately 30 publications and presentations of geophysical, seismic, and environmental topics.

PRIVILEGED

MARK P. ZATEZALO
PRINCIPAL HYDROGEOLOGIST

Mr. Zatezalo has more than 12 years of experience primarily in the fields of hydrogeology and environmental geology. He is experienced in the siting of major facilities with respect to environmental and groundwater concerns. He serves as a consultant with respect to hydrogeologic issues on all major projects performed by the firm and on projects dealing with assessment of risk.

EDUCATION
M.A., 1977, Geology (Hydrogeology), University of Missouri-Columbia
B.S., 1974, Geology, West Virginia University
Health and Safety Training in Accordance with OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"

BACKGROUND AND EXPERIENCE
1985 to Present - Principal - Hydrogeologist, Rizzo Associates. Since joining Rizzo Associates in 1985, Mr. Zatezalo has been responsible for the technical direction of hydrogeologic contamination assessment projects and remedial actions to mitigate soil and groundwater contamination. Specific responsibilities with Rizzo Associates have included management of several large projects involving the feasibility and permitting of landfills. He has also served as a consultant on many projects dealing with hydrogeologic issues and projects concerned with property transfer risk assessments.

As project manager for various government agencies and private clients, Mr. Zatezalo has been responsible for overall technical, budget, and schedule matters associated with several large projects involving the feasibility, design, and permitting of landfills. He has effectively managed significant subcontracting efforts, remedial implementation activities, and construction projects related to groundwater contamination.

Mr. Zatezalo has also managed multidisciplinary projects associated with field exploration and monitoring well installation, laboratory analysis, and cost control of various facilities which required hydrogeology, pollutant transport evaluation, and design. He has been involved in design and evaluation of groundwater recovery and treatment systems at several contaminated sites.

1982 to 1985 - Corporate Hydrogeologist, Browning-Ferris Industries, Inc. (BFI). Mr. Zatezalo was responsible for groundwater monitoring plans at over 50 hazardous and municipal waste disposal facilities. He was also responsible for hydrogeologic aspects of remedial planning and

regulatory interfacing on the local, state, and national levels, and for technical evaluation of real estate for development of waste disposal facilities. Mr. Zatezalo also performed leachate generation and water balance assessments for numerous land disposal facilities and managed subsurface investigations at new and existing disposal sites.

1977 to 1982 - Hydrogeologist, D'Appolonia Consulting Engineers. Mr. Zatezalo's work included assessment of local and regional groundwater characteristics, mass transport, and aquifer performance. Typical projects involved both surface and underground mines, port facilities, uncontrolled waste sites, waste disposal facilities, and industrial plants. He was responsible for field investigations, laboratory investigations, and computer modeling and analysis of groundwater flow regimes associated with numerous hydrogeologic investigations and environmental assessments.

AFFILIATIONS
Association of Ground Water Engineers and Scientists

PUBLICATIONS
Mr. Zatezalo has authored two publications in the environmental field.

(Mark P. Zatezalo)

PUBLICATIONS

Zatezalo, M.P. and P.F. O'Hara, 1987, "Environmental Risk Considerations in Real Estate Transfers for Active Waste Management Facilities," Proceedings of the 8th National Conference, Superfund '87, Washington, D.C.

Zatezalo, M.P., D.K. Hunt, and M.E. Hogan, 1979, "The Impact of the Barnes and Tucker Case to Coal Mine Planning for the Control of Acid Mine Drainage," Proceedings of the 5th National Ground Water Quality Symposium, Las Vegas, Nevada.

PRIVILEGED

BETH F. COCKCROFT
PROJECT MANAGER
DIRECTOR OF QUALITY ASSURANCE

Ms. Cockcroft has nine years of experience in environmental and civil engineering where her work has been oriented toward the technical aspects of surface and groundwater investigation and contamination remediation. She currently serves as the firm's Director of Quality Assurance.

EDUCATION
Post Graduate Studies, University of Pittsburgh
M.S., 1981, Environmental Engineering, University of Cincinnati
B.S., 1980, Civil Engineering, University of Cincinnati
Health and Safety - EPA Intermediate Level Training, National Spill Control School, Corpus Christi State University

REGISTRATION/CERTIFICATIONS
Professional Engineer, Pennsylvania
Certified Commercial Scuba Diver
Health and Safety Training in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Cardiopulminary Resuscitation - American Red Cross

EXPERIENCE AND BACKGROUND
1985 to Present - Project Manager, Rizzo Associates. Ms. Cockcroft presently serves as the Director of Quality Assurance and is responsible for implementation of the corporate quality assurance program. Prior to her current duties, Ms. Cockcroft participated in several civil and remedial design and construction projects involving preparation of detailed plans, specifications, and cost estimates. Representative projects include dam remediation, "RCRA-type" clay cap and synthetic cap system designs, leachate collection and treatment systems, and surface water diversion systems. Ms. Cockcroft has also designed and implemented several field and office evaluations of contaminant infiltration and migration in groundwater to define the regional and site hydrogeology and to document existing contamination. She has supervised drilling, monitoring well installation, soil and groundwater sampling activities, and implementation of health and safety protocols pertaining to remedial investigations.

Other projects which she has supervised include:

- Leachate treatability assessments which included comprehensive laboratory analysis and treatment process evaluation.

- Comprehensive investigation of a chemical manufacturing facility to determine and assess potential environmental liabilities.

- Site evaluation studies for a hazardous waste landfill involving conceptual and detailed design, operating plans, surface and groundwater controls, and completion of the permit application.

1981 to 1985 - Assistant Project Engineer, D'Appolonia Consulting Engineers. Ms. Cockcroft was involved in interdisciplinary projects during her tenure at D'Appolonia (subsequently IT Corporation). Her duties included project responsibilities and participation in quality assurance audits and reviews. Typical projects included:

- Determined hydrologic impacts of a mining operation on the groundwater regime utilizing computer simulation techniques.

- Supervised a mobile analytical laboratory and quality control program for on-site analysis of waste, soil, and water samples pertaining to hazardous waste sites. In addition, she conducted an evaluation of analytical data relative to the assessment of remedial action alternatives for these sites.

- Compiled information and authored Remedial Investigation/Feasibility Study (RI/FS) reports for two CERCLA (Superfund) sites.

- Evaluated erosion and sedimentation control techniques and design of sedimentation basins, diversion ditches, and revegetation programs at several sites.

- Performed the conceptual design of a landfill which included assessment of site feasibility based on a groundwater investigation and soil compatibility analysis.

- Participated in an assessment of radioactive contaminant migration and the future extent of migration downgradient from a uranium tailings pond. Performed computer modeling of saturated/unsaturated contaminant migration.

(Beth F. Cockcroft)

AFFILIATIONS
American Society of Civil Engineers
National Water Well Association

PUBLICATIONS
Ms. Cockcroft is the author of three technical publications in civil and environmental engineering.

PRIVILEGED

DAVID M. BROWN
SENIOR PROJECT ENGINEER

Mr. Brown's background covers a wide range of technical aspects of the environmental field, including contaminant fate and transport, hydraulics and hydrology, geology, chemistry, laws and regulations, waste treatment, health and safety, and risk assessment. He has prepared work plans for RI/FS projects, managed field investigations for the RI phase of site investigations, and participated in the feasibility study portions of Superfund site evaluations. His technical specialties are groundwater modeling, fractured rock hydrology, and contaminant transport.

EDUCATION
M.S., 1984, Civil Engineering, Massachusetts Institute of Technology
B.S., 1981, Civil Engineering, Massachusetts Institute of Technology

REGISTRATION/CERTIFICATION
Engineer-in-Training, Pennsylvania

EXPERIENCE AND BACKGROUND
May 1989 to Present - Project Engineer to Senior Project Engineer, Rizzo Associates. Mr. Brown is a recent employee and will be responsible for a wide range of environmental topics, including RI/FS studies and contaminant transport modeling.

1987 to 1989 - Assistant Project Manager, ICF Technology, Inc. Mr. Brown was responsible for preparing the Work Plan and Remedial Investigation Report for the Norwood PCB Superfund site RI/FS and was also the leader of the field team for conducting the remedial investigation. His responsibilities involved supervising drillers, sampling operations, and field and laboratory testing. Mr. Brown also co-authored the Pinette's Salvage Yard Superfund site feasibility study report. His RCRA experience at ICF included providing technical assistance during a private client's Consent Order negotiations with both the USEPA and Ohio EPA regarding contamination at a RCRA facility. He also designed a compliance groundwater monitoring program for this site.

1984 to 1987 - Groundwater Hydrologist/Engineer, Goldberg-Zoino & Associates, Inc. Mr. Brown designed and participated in field investigations for groundwater problems at several sites. He was also responsible for mathematical and computer modeling of groundwater flow and contaminant transport. On one project, the Gilson Road Superfund Site supervised pumping tests and used the data in conjunction with a three-dimensional groundwater flow model to determine the as-built effectiveness of slurry walls in containing contaminated groundwater.

AFFILIATIONS
American Geophysical Union

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PUBLICATIONS
Mr. Brown has published several papers related to groundwater modeling.

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PRIVILEGED

WILLIAM A. BAUGHMAN
SENIOR PROJECT GEOLOGIST

Mr. Baughman has over eight years of experience in supervision of subsurface explorations, site investigations, and site characterizations. He is also experienced in using the data gained in the field for preparation of geologic cross sections and fence diagrams and in the preparation of report sections documenting field activities. His project responsibilities on four Superfund sites include site investigation and engineering geology activities.

EDUCATION
Graduate Studies, Hydrogeology, Wright State University
B.A., 1981, Geology, Alfred University

REGISTRATION/CERTIFICATIONS
American Institute of Professional Geologists - Certified Professional Geologist, No. 7305
Health and Safety Training in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Cardiopulmonary Resuscitation - American Red Cross

EXPERIENCE AND BACKGROUND
1985 to Present - Senior Project Geologist, Rizzo Associates.
Mr. Baughman has been involved in the supervision of a variety of site investigations involving soil sampling, rock coring, monitoring well design and installation, borehole geophysical logging, surface geophysical studies and soil gas analysis. Duties have also included developing geologic cross sections, isometric fence diagrams, and contour maps from field data, researching the local and regional geology of project sites, and report preparation. Several projects in which Mr. Baughman has participated include:

- The review of a geologic/geomorphic aerial photographic interpretation for a low-level radioactive disposal facility in Spain.
- Aerial photographic interpretation for a fracture trace analysis related to a groundwater study in Gettysburg, Pennsylvania.
- A geophysical survey utilizing electromagnetics and a magnetometer to investigate suspected linear trenches and drum disposal areas at a pesticide processing plant.

Most recently, Mr. Baughman supervised the drilling operations and installation of monitoring wells for a major industrial client at a Superfund Site in Gettysburg, Pennsylvania. He also supervised the geotechnical boring program and monitoring well installation at the Moyer Landfill Superfund Site in Collegeville, Pennsylvania; the Monroe Township Superfund Site in Jamesburg, New Jersey; and the South Brunswick Superfund Site in South Brunswick, New Jersey.

1983 to 1985 - Geologist, Walter E. Fike Consulting Engineers. Duties included geologic field investigation of proposed mining sites, evaluation of environmental impacts due to surface coal mining, surface and groundwater sampling, logging of test borings, installation of monitoring wells and private water supply wells, and sampling coal overburden and analyzing results of acid-base account testing.

1981 to 1983 - Geologist, Decollement Consulting, Inc. Duties included sampling, analyzing, and description of rock chips and rock cores during oil and gas exploration drilling. His work also involved evaluation of geologic formations encountered, drill-stem testing, and interpretation and correlation of borehole geophysical logs as well as continuous monitoring of formation gas using a gas chromatography and flame ionization detector, including calibration, maintenance, and analysis of data.

AFFILIATIONS
American Institute of Professional Geologists
Association of Ground Water Scientists and Engineers
Pittsburgh Geological Society
Pittsburgh Association of Petroleum Geologists

PUBLICATIONS
Mr. Baughman co-authored a technical paper on the Lackawanna Refuse Superfund Site, which is located in Old Forge, Pennsylvania.

PRIVILEGED

BETH ANN JENKINS
ASSISTANT PROJECT SCIENTIST

Ms. Jenkins' background and experience in the environmental field primarily involves health and safety issues and assessment of risks associated with contaminated materials sites. She is currently responsible for assisting in the development and implementation of Site Specific Health and Safety Plans and the management of Rizzo Associates' Corporate Employee Medical Surveillance and Right-to-Know programs. Ms. Jenkins routinely meets with field personnel and subcontractors on hazardous materials projects to ensure ongoing compliance with these programs and regulations.

EDUCATION
M.S., 1987, Occupational Health and Safety Engineering,
West Virginia University
B.A., 1986, Biology, West Virginia University

CERTIFICATIONS
American Red Cross Cardiopulmonary Resuscitation Instructor
Health and Safety Training in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"

EXPERIENCE AND BACKGROUND
July 1989 to Present - Assistant Project Scientist, Rizzo Associates. Since joining the firm, Ms. Jenkins has been responsible for managing corporate safety and health issues such as the Employee Medical Surveillance and Worker Right-to-Know programs. She has assisted in the development and implementation of health and safety plans for a variety of geotechnical projects located in the states of Pennsylvania, Ohio, and New Jersey. She is currently serving as the Health and Safety Officer for a project at a RCRA landfill investigation site in Ohio. Ms. Jenkins is also currently focusing on expanding the company's internal respiratory protection program.

January 1988 to June 1989 - Industrial Hygienist, Clayton Environmental Consultants, Inc. As an industrial hygienist in the indoor air quality department at Clayton, Ms. Jenkins was responsible for writing proposals, performing field investigations involving hygiene sampling, analyzing sampling results, and presenting formalized reports for clients. These reports included recommendations for engineering and administrative controls and modification of work practices and processes.

AFFILIATIONS
American Industrial Hygiene Association

PRIVILEGED

CHRISTINE VARGAS
ASSISTANT PROJECT ENGINEER

Ms. Vargas is a chemical engineer with over five years of progressively responsible experience in quality control, process control, and related technical work in water treatment projects. She possesses an extensive background in all phases of laboratory testing procedures in accordance with EPA Standard Methods. She also has practical knowledge in all aspects of water treatment (e.g., mixing, flocculation, sedimentation, filtration, waste disposal, and monitoring of field operations).

EDUCATION
B.S., 1983, Chemical Engineering, West Virginia Institute of Technology

CERTIFICATION/REGISTRATION
Health and Safety Training in Accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
EPA Laboratory Certification for Bacteriological Testing and Chemical Analysis
West Virginia Water Treatment License, Class III (of IV)

EXPERIENCE AND BACKGROUND
January 1990 to Present - Assistant Project Engineer, Rizzo Associates. Ms. Vargas utilizes her background and expertise in quality assurance/quality control procedures and data validation on the firm's environmental projects. She has an extensive knowledge of contract laboratory protocol and has conducted audits to assess and monitor the performance of contract laboratories. She has also coordinated the acquisition of environmental information to perform data validation.

In her position with Rizzo Associates, Ms. Vargas will have extensive interface responsibilities with governmental and environmental organizations, such as state and federal agencies (EPA, DER, OSHA).

1984 to January 1990 - Quality Control Supervisor, Clarksburg Water Board. In this position, Ms. Vargas reported to the general manager and was responsible for supervising and directing a crew to monitor and operate a 10 MGD water treatment plant. She acted as the lead liaison to the West Virginia State Environmental Engineering Division and reported regularly on the facility's operational progress. In this capacity, Ms. Vargas administered bid specifications, performed inventory control and conducted purchasing activities.

Several specific accomplishments included:

- Development of methods to measure and improve the efficiency of the water treatment process, ensuring optimal allocation of resources.

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- Development of a quality assurance plan to establish an EPA certified laboratory for bacteriological testing and chemical analysis.

AFFILIATIONS
American Institute of Chemical Engineers
American Water Works Association

PRIVILEGED

MATTHEW E. GREBNER
ENGINEER

Mr. Grebner has nearly four years of experience in the fields of civil and geotechnical engineering. Since joining Rizzo Associates, he has primarily been involved in civil and geotechnical aspects of environmental engineering projects. He is also experienced in the development and implementation of computer systems and programming.

EDUCATION
M.S.C.E., 1989, Geotechnical Engineering, Massachusetts Institute of Technology
B.S.C.E., 1985, Geotechnical Concentration, Rensselaer Polytechnic Institute

REGISTRATION/CERTIFICATION
Health and Safety Training in Accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operation and Emergency Response"
Engineer-in-Training

EXPERIENCE AND BACKGROUND
August 1989 to Present - Engineer, Rizzo Associates. Since joining the firm, Mr. Grebner has been responsible for civil, geotechnical, and environmental engineering aspects of several projects including the review of remedial action designs, contamination assessment, remedial action planning, landfill design, writing reports and specifications, foundation feasibility investigations and stability analyses. He has also performed field investigations on several solid waste landfill projects where responsibilities involved the installation of gas monitoring wells and pump test wells, performance of in situ permeability testing, soil and rock boring, and test pit installations.

June 1987 to August 1987 - Field Geotechnical Engineer, The Geotechnical Group, Inc. Mr. Grebner monitored construction activities, conducted field density tests, performed site investigation and exploration activities, and wrote reports.

July 1986 to June 1987 - Engineer, Urban Engineers, Inc. Mr. Grebner was responsible for the development and implementation of the company's computer aided design and drafting (CADD) system. He supervised the team performing design work at several major airports and on interstate roadways.

1985 to 1986 - Director of Communications, Division of Medical Genetics, Thomas Jefferson University. Mr. Grebner converted the department's manual record keeping system to a computerized system. He designed and developed software, selected and installed hardware for the entire system, and trained staff members in its use.

AFFILIATION
American Society of Civil Engineers

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PRIVILEGED

SCOTT ALLYN HARRIS
ENGINEER

Mr. Harris's background and interests include the disciplines of mechanical and civil engineering. His educational background has given him the opportunity to be involved in analysis and design for several environmental projects.

EDUCATION
B.S., 1989, Civil Engineering Technology, University of Pittsburgh
Associate Engineering, 1985, Mechanical Engineering Technology,
Pennsylvania State University

BACKGROUND AND EXPERIENCE
January 1990 to Present - Engineer, Rizzo Associates. Since joining the firm, Mr. Harris has been involved in environmental engineering projects, which have included the following:

- Performed a value engineering analysis on the initial design of the Moyer Landfill Superfund Site in eastern Pennsylvania.
- Performed a partial and full cap regrading plan for the Moyer Landfill.
- Performed research for the Army Creek Landfill in New Castle County, Delaware.

AFFILIATIONS
American Society of Civil Engineers

WPL 005 5743

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PRIVILEGED

JEFFREY D. HOLCHIN
ENGINEER

Mr. Holchin's educational background and work experience have given him the opportunity to be involved with various types of construction inspection, lab testing of soil and water, and analysis/design for environmental, structural, and geotechnical projects.

REGISTRATION/CERTIFICATION
Health and Safety Training in Accordance with OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Engineer-in-Training, Pennsylvania

EDUCATION
Graduate Studies, Geotechnical Engineering, University of Pittsburgh
B.S., 1988, Civil Engineering, University of Pittsburgh

BACKGROUND AND EXPERIENCE
January 1989 to Present - Engineer, Rizzo Associates. Since joining the firm, Mr. Holchin has been involved with several environmental, geotechnical, and structural projects where his assignments have included the following:

- Performed the static stability analysis for an earth fill hydroelectric dam located in Columbia, South Carolina. This involved the development of cross-sections and flow nets as well as the selection of appropriate strength parameters for use in the computer program.
- Involvement in the field investigation of the earth fill hydroelectric dam, which included supervision of the test boring work and piezometer installation.
- Assessment of Contractor submittals for the Moyer Landfill project.
- Performed calculations for the cost estimate for the Moyer Landfill Superfund site.
- Worked on regrading and final grade drawings for the Moyer Landfill Superfund site.
- Performed calculations for the surface water controls for Moyer Landfill, including the design of a road ditch, downslope drain, and energy dissipators.

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- He has been involved with the structural analysis of a concrete hydroelectric dam, using a computer program that models the dam and various loading conditions.
- He was involved with the assessment of a hydroelectric dam in Augusta, Georgia. A computer program that modeled the dam and river was used to determine the effects of various flood levels.
- Performed calculations for the bearing capacity and settlement of the soil beneath the liner for the Carbon-Limestone Landfill project.

1988 - Engineer-in-Training, Ackenheil and Associates Consulting Engineers. Mr. Holchin worked as an assistant to the senior engineer, developing a site plan for an asphalt plant, supervising test borings, working in a soils lab, preparing drawings, and working on slope stability and foundation design calculations.

1985 to 1987 - Construction Inspector, Pennsylvania Department of Transportation. During the three summers with PennDOT, Mr. Holchin was involved with the construction inspection of deep and shallow foundations, retaining walls, concrete culverts, soil excavation and placement, road rehabilitation, and various phases of construction for three bridges.

1985 to 1986 - Lab Technician, Koppers Company, Inc. Mr. Holchin worked as an assistant to the engineer, and performed work in testing and treating contaminated materials in a water quality lab and soils engineering lab.

AFFILIATIONS
American Society of Civil Engineers
National Society of Professional Engineers